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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER	
WEISKOPF, MARIE	

ART UNIT	PAPER NUMBER
3661	

DATE MAILED: 07/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/724,997	TAKAHASHI ET AL.	
	Examiner	Art Unit	
	Marie A. Weiskopf	3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/7/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 11, filed 4/17/06, with respect to the rejection(s) of claim(s) 1-15 under 102(e) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-9, 11-12 and 14-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Katou et al (US 2004/0040778). Katou et al discloses a vehicle steering system comprising:

- In regard to claim 1, a steering control apparatus which comprises:
    - A steered wheel drive mechanism including a plurality of motors for driving a steered wheel, wherein the plurality of motors are arranged coaxially, have substantially the same performance, and are driven simultaneously (Pages 1-2, paragraph 18)

- A plurality of systems comprised by the plurality of motors and the plurality of control means (Pages 1-2, paragraph 18), wherein the control means of one of the systems comprises:
  - Means for generating a first torque command representing torque for turning the steered wheel based on the steering position of a steering wheel and position information of the motor associated with the one of the systems (Page 3, paragraph 31)
  - Means for distributing the first torque command in to the plurality of systems as one or more divided torque commands (Page 3, paragraph 32)
  - Means for controlling the torque of one of the motors associated with said one of the systems in accordance with the distributed torque command distributed to the one of the systems (Page 3, paragraph 40)
- Wherein the control means of at least a further one of the systems comprises means for controlling the torque of a further one of the motors associated with said further one of the systems in accordance with the distributed to the further one of the systems (Page 3, paragraph 40)

- In regard to claim 2, each of the systems further includes an impairment detecting means for detecting impairment of the system wherein when one or more of the systems, including the one of the systems generating the first torque

command, is impaired (Pages 2-3, paragraphs 28-29), the control means of one of the systems that is functioning normally:

- Generates a second torque command representing torque for driving the steered wheel based on a steering position of the steering wheel and position information of the associated one of the motors (Page 4, paragraph 51)
- Generates one or more distributed torque commands from the second torque command in accordance with the number of the systems that are functioning normally, each of the distributed torque commands generated from the second torque command being distributed to an associated one of the systems that is functioning normally (Page 4, paragraph 52)
- Controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to one of the systems that is functioning normally (Page 4, paragraph 53)
- Wherein the control means of at least a further one of the other systems that is functioning normally controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to at least the further one of the systems functioning normally. (Page 4, paragraph 46)

- In regard to claim 3, each of the systems further includes an impairment detecting means for detecting impairment of the system, wherein when one or

more of the systems, excluding the one of the systems generating the first torque command, is impaired, the control means of one of the systems:

- Generates the one or more distributed torque commands from the first torque command in accordance with the number of systems that are functioning normally, each of the one or more distributed torque commands being provided to an associated one of the systems that is functioning normally (Page 3, paragraph 32)
- Controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to one of the systems (Page 3, paragraph 32)
- The control means of at least a further one of the systems that is functioning normally controls the torque of the associated one of the motors in accordance with the distributed torque command distributed to at least a further one of the systems functioning normally (Page 4, paragraph 46)

- In regard to claims 4 and 5, the controlling torque of the associated one of the motors includes feedback controlling of excitation current of the associated one of the motors, each of the control means having different current loop gains for the feedback controlling when all of the systems are functioning normally as compared to when one or more of the systems is impaired. (Page 3, paragraph 32)

- In regard to claim 6, a steering control apparatus for a vehicle having a steering wheel and a steered wheel, the apparatus comprising:
    - A plurality of motors for turning the steered wheel, the plurality of motors having substantially the same performance (Pages 1-2, paragraph 18)
    - A plurality of control units capable of mutual communication, each of the control units controlling an associated one of the motors, the control units and the motors forming a plurality of systems, wherein each control unit executes mutual communication and determines whether the corresponding system is normal or impaired (Pages 1-2, paragraph 18; Pages 2-3, paragraphs 28-29)
    - A steering sensor for detecting the operating angle of the steering wheel (50 in Figure 2; Page 2, paragraph 19)
    - When each of the systems is operating normally, one of the control units:
        - Generates a torque command representing torque required to turn the steered wheel in accordance with the operating angle detected by the steering sensor (Page 3, paragraph 31)
        - Distributes the torque command to the plurality of systems as a plurality of distributed torque commands (Page 3, paragraph 32)
    - Each of the control units controls the associated motor in accordance with the associated distributed torque command (Page 3, paragraph 40)
- In regard to claim 7, when each of the systems is operating normally, one of the control units generates the distributed torque commands, then number of which

is equal to the number of systems, and the motors are driven with mutually equal torques in accordance with the distributed torque commands. (Page 3, paragraph 32, paragraph 40)

- In regard to claim 8, the plurality of motors includes at least a first motor and a second motor, the plurality of control units includes at least a first control unit for controlling the first motor and a second control unit for controlling the second motor, and the plurality of systems includes at least a first system containing the first motor and the first control unit and a second system containing the second motor and the second control unit (Pages 1-2, paragraph 18), the one control unit being the first control unit:
    - When one or more of the systems, including the first system, is impaired, and one or more systems, including the second system is operating normally (Page 4, paragraph 50):
        - The first control unit stops generating and providing the torque command and the distributed torque commands in addition to stopping the first motor wherein the second control unit:
            - Generates the torque command representing torque required to turn the steered wheel in accordance with the operating angle detected by the steering sensor (Page 4, paragraph 52)
            - Divides the torque command into a number equal to the number of one or more normal systems to generate one or

more of the distributed torque commands (Page 4, paragraph 52)

- Provides the one or more distributed torque commands to one or more normal systems (Page 4, paragraph 52)

- Each of the control units corresponding to one or more normally operating system drives the associated motor in accordance with the associated distributed torque command (Page 4, paragraph 53)

- In regard to claim 9, when the second system alone is the one or more normally operating system, the torque command and the distributed torque command are the same (Page 5, paragraph 57)
- In regard to claim 11, the plurality of motors includes at least a first motor and a second motor, the plurality of control units includes at least a first control unit for controlling the first motor and a second control unit for controlling the second motor, and the plurality of systems includes at least a first system containing the first motor and the first control unit and a second system containing the second motor and the second control unit (Page 2, paragraph 18), which one control unit being the first control unit:
  - When one or more of the systems, including the first system, is operating normally, and one or more of the systems, including the second system, is impaired, the first control unit generates:

- A torque command representing a torque required to turn the steered wheel in accordance with the operating angle detected by the steering sensor (Page 4, paragraph 52)
- Divides the torque command into a number equal to the number of said one or more normally operating systems to generate one or more of the distributed torque commands (Page 4, paragraph 52)
- Provides the one or more distributed torque commands to the one or more normally operating systems (Page 4, paragraph 52)

  - Each of the control units corresponding to one or more normally operating systems drives the associated motor in accordance with the associated distributed torque command (Page 4, paragraph 53)

- In regard to claim 12, the first system alone is the one or more normally operating systems, the torque command and the distributed torque command are the same (Page 5, paragraph 57)
- In regard to claim 14, a steering control method for a vehicle having a steering wheel, a steered wheel, and a plurality of motors having substantially the same performance for turning the steered wheel (Page 2, paragraph 18), the method comprising:

  - Detecting an operating angle of the steering wheel (50 in Figure 2; Page 2, paragraph 19)

- Generating a torque command representing torque required for turning the steered wheel in accordance with the operating angle (Page 4, paragraph 52)
- Dividing the torque command to generate a plurality of distributed torque commands, each associated with one of the motors (Page 4, paragraph 52)
- Controlling the motors in accordance with the distributed torque commands (Page 4, paragraph 52)

- In regard to claim 15, a steering control method for a vehicle having a steering wheel , a steered wheel, a plurality of motors mutually having substantially the same performance for turning the steered wheel, and a plurality of control units, each controlling an associated one of the motors, the motors and the control units forming a plurality of systems, wherein the systems includes a first system containing a first motor and a first control unit for controlling the first motor and a second system containing a second motor and a second control unit for controlling the second motor (Page 2, paragraph 18), the method comprising:
  - Checking whether or not the systems are operating normally (Page 4, paragraph 50):
  - Detecting an operating angle of the steering wheel (50 in Figure 2; Page 2, paragraph 19)
  - Driving the motors in accordance with the operating angle, the driving including when the systems are operating normally:

- Generating a torque command representing torque required with the first control unit to turn the steered wheel in accordance with the operating angle (Page 3, paragraph 31)
- Dividing the torque command with the first control unit to generate a plurality of distributed torque commands, each corresponding to an associated one of the motors (Page 3, paragraph 32)
- Controlling the motors with the first control unit in accordance with the distributed torque commands (Page 3, paragraph 40)

o When one or more of the systems including the first system are operating normally and one or more systems including the second system are impaired:

- Stopping the motor associated with each control unit corresponding to one or more impaired systems (Page 2, paragraph 28)
- Generating the torque command representing torque required to turn the steered wheel with the first control unit in accordance with the detected operating angle (Page 3, paragraph 32)
- Dividing the torque command into a number equal to the number of systems that are normal with the first control unit to generate one or more distributed torque commands (Page 3, paragraph 32)
- Providing the one or more distributed torque commands to an associated one of each of the one or more normal systems with the first control unit (Page 3, paragraph 32)

- Driving the associated motor in accordance with the associated distributed torque command with each of the control units corresponding to at least one normally operating system (Page 3, paragraph 40)

- When one or more of the systems, including the first system are impaired and one or more of the systems including the second system are operating normally:
  - Stopping the motor associated with each control unit corresponding to the one or more impaired systems (Page 2, paragraph 28)
  - Generating the torque command representing torque required to turn the steered wheel with the second control unit in accordance with the detected operating angle (Page 4, paragraph 52)
  - Dividing the torque command into a number equal to the number of the systems that are normal with the second control unit to generate one or more distributed torque commands (Page 4, paragraph 52)
  - Providing the one or more distributed torque commands to an associated one of each of the one or more normal systems with the second control unit (Page 4, paragraph 52)
  - Driving the associated motor in accordance with the associated distributed torque command with each of the control units

corresponding to the at least one normally operating system.

(Page 4, paragraph 52)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katou et al (US 2004/0040778) in view of Laurent et al (US 6,820,715). Katou et al is discussed above and Laurent et al was discussed in the previous office action. Katou et al fails to disclose the steering sensor is one of a plurality of steering sensors, each connected to an associated one of the control units, the steering sensor being connected to the first control unit. Laurent et al, however, discloses this. (Column 5, line 63 – Column 6, line 14) It would have been obvious to one having ordinary skill in the art at the time of the invention to include multiple steering sensors as discussed in Laurent et al because Laruent et al discusses having multiple steering sensors can allow the system to decide if the steering sensors are working properly by comparing the output of the different steering sensors with each other.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marie A. Weiskopf whose telephone number is (571)

272-6288. The examiner can normally be reached on Monday-Thursday between 7:00 AM and 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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THOMAS BLACK
SUPERVISORY PATENT EXAMINER